

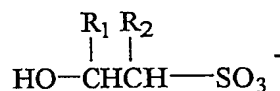
What is claimed is:

1. A process useful for forming an aqueous composition of matter comprising a mixture of alkyl-substituted hydroxyethane sulfonates comprising the steps of:

- 5 a) providing at least one alkylene oxide having between 3 and 8 carbon atoms per molecule;
- b) providing an aqueous solution comprising bi-sulfite anions;
- c) contacting the aqueous solution with the alkylene oxide while maintaining the pH at a range between about 6.0 and about 10.0,

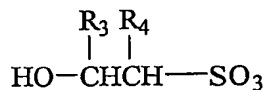
wherein the mixture of alkyl-substituted hydroxyethane sulfonates comprises:

- 10 (i) a first anion having the structure:



wherein one of R<sub>1</sub> and R<sub>2</sub> is a straight chain or branched C<sub>1</sub> to C<sub>6</sub> alkyl group and the remaining R<sub>1</sub> and R<sub>2</sub> is hydrogen; and

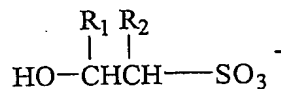
- (ii) a second anion having the structure:



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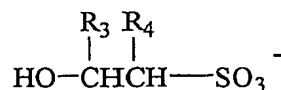
wherein one of R<sub>3</sub> and R<sub>4</sub> is a straight chain or branched C<sub>1</sub> to C<sub>6</sub> alkyl group and the remaining R<sub>3</sub> and R<sub>4</sub> is hydrogen.

2. The process according to claim 1 wherein the aqueous solution of bi-sulfite ions further includes at least one ion selected from the group consisting of: sodium, potassium, lithium, magnesium, calcium and ammonium ions.
- 5 3. The process according to claim 1 wherein the contacting is conducted at a temperature range of between about 20° C to about 200° C.
4. The process according to claim 1 wherein the contacting is conducted at a pressure range of between about 0.5 atmospheres and about 7 atmospheres.
- 10 5. A process useful for forming an aqueous composition of matter comprising a mixture of alkyl-substituted hydroxyethane sulfonates comprising the steps of:
- a) providing at least one alkylene oxide having between 3 and 8 carbon atoms per molecule;
- 15 b) providing an aqueous solution comprising bi-sulfite anions wherein the bi-sulfite anions are produced by reacting sulfur dioxide with an hydroxide solution;
- c) contacting the aqueous solution with the alkylene oxide, while maintaining the pH at a range between about 7.0 and about 8.0,
- wherein the mixture of alkyl-substituted hydroxyethane sulfonates comprises:
- 20 (i) a first anion having the structure:



wherein one of  $R_1$  and  $R_2$  is a straight chain or branched  $C_1$  to  $C_6$  alkyl group and the remaining  $R_1$  and  $R_2$  is hydrogen; and

(ii) a second anion having the structure:



5 wherein one of  $R_3$  and  $R_4$  is a straight chain or branched  $C_1$  to  $C_6$  alkyl group and the remaining  $R_3$  and  $R_4$  is hydrogen.

6. The process according to claim 5 wherein the hydroxide solution is a 50% by weight sodium hydroxide solution.

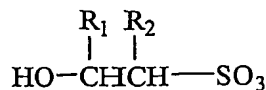
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7. A process useful for forming an aqueous composition of matter comprising a mixture of alkyl-substituted hydroxyethane sulfonates comprising the steps of:

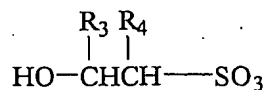
- a) providing an alkylene oxide selected from the group consisting of: propylene oxide and butylene oxide, and mixtures thereof;
- 15 b) providing an aqueous solution of bi-sulfite anions;
- c) contacting the aqueous solution with the alkylene oxide, while maintaining the pH at a range of between about 6.0 and 10.0,

wherein the mixture of alkyl-substituted hydroxyethane sulfonates comprises:

(i) a first anion having the structure:



and (ii) a second anion having the structure:



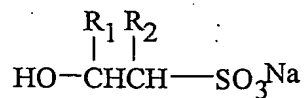
5 wherein R<sub>1</sub> is independently selected from the group consisting of: methyl and ethyl; R<sub>2</sub> is hydrogen; R<sub>3</sub> is hydrogen; and R<sub>4</sub> is independently selected from the group consisting of: methyl and ethyl.

8. A process for forming a powder comprising a mixture of sodium alkyl-substituted  
10 hydroxyethane sulfonates comprising the steps of:

- a) providing an alkylene oxide selected from the group consisting of: propylene oxide and butylene oxide, and mixtures thereof;
- b) providing an aqueous solution of sodium bi-sulfite;
- c) contacting the aqueous solution of sodium bi-sulfite with the alkylene oxide,  
15 while maintaining the pH at a range of between about 6.0 and 10.0 for about 1 to about 6 hours to form a product mixture; and
- d) drying the product mixture to the powder,

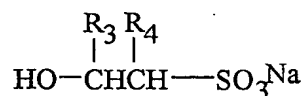
wherein the mixture of sodium alkyl-substituted hydroxyethane sulfonates comprises:

(i) a first sodium alkyl-substituted hydroxyethane sulfonate having the structure:



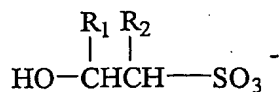
and (ii) a second sodium alkyl-substituted hydroxyethane sulfonate having the

5 structure:



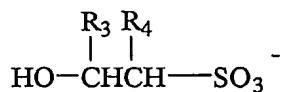
wherein  $R_1$  is independently selected from the group consisting of: methyl and ethyl;  $R_2$  is  
10 hydrogen;  $R_3$  is hydrogen; and  $R_4$  is independently selected from the group consisting of:  
methyl and ethyl.

9. An aqueous composition of matter which comprises a first anion having the  
structure:



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wherein one of  $R_1$  and  $R_2$  is a straight chain or branched  $C_1$  to  $C_6$  alkyl group and the  
remaining  $R_1$  and  $R_2$  is hydrogen; and a different second anion having the structure:



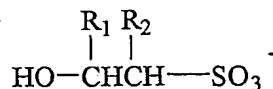
wherein one of R<sub>3</sub> and R<sub>4</sub> is a straight chain or branched C<sub>1</sub> to C<sub>6</sub> alkyl group and the remaining R<sub>3</sub> and R<sub>4</sub> is hydrogen.

10. The composition according to claim 9 wherein the C<sub>1</sub> to C<sub>6</sub> alkyl group on the first anion is the same as the C<sub>1</sub> to C<sub>6</sub> alkyl group on the second anion.

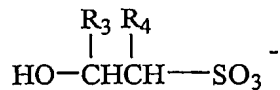
11. The composition according to claim 9 wherein water is present in an amount between about 20% and about 90 % by weight based on the total weight of the composition.

12. An aqueous composition of matter which comprises:

(i) a first anion having the structure:



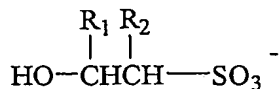
and (ii) a second anion having the structure:



wherein R<sub>1</sub> is independently selected from the group consisting of: methyl and ethyl; R<sub>2</sub> is hydrogen; R<sub>3</sub> is hydrogen; and R<sub>4</sub> is independently selected from the group consisting of: methyl and ethyl.

13. A process for producing a surfactant material useful as a component of a personal care cleansing composition which comprises:

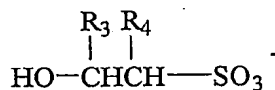
a) providing a mixture of isethionate anions which comprises a first anion having the structure:



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in which R<sub>1</sub> is straight chain or branched C<sub>1</sub> to C<sub>6</sub> alkyl group and R<sub>2</sub> is hydrogen;  
and

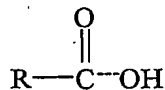
(ii) a second anion having the structure:



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in which R<sub>3</sub> is hydrogen and R<sub>4</sub> is an straight chain or branched C<sub>1</sub> to C<sub>6</sub> alkyl group;

b) contacting the mixture of isethionate anions with one or more carboxylic acids of the formula:



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in which R is any hydrocarbon group having between about 4 and about 25 carbon atoms, including straight-chain, branched, saturated and unsaturated hydrocarbon groups so as to form a reactive mixture; and

c) heating the reactive mixture at any temperature in the range of between 90° C and 240°C to produce an acyl alkylisethionate mixture containing at least two different anions which are isethionate esters of a carboxylic acid.

14. The process according to claim 13 further comprising the step applying a vacuum of about 1 mm to about 200 mm Hg at a temperature of about 100° to about 200°C to reduce the amount of carboxylic acid in the surfactant material to less than 10% by weight.

15. An ester anion mixture having surfactant properties useful in formulating personal care cleansing products comprising:

a) a first ester anion having the structure:



and

b) a second ester anion having the structure:



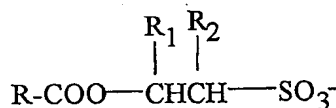
in which R is in each occurrence a hydrocarbon group having between about 4 and about 25 carbon atoms, including straight-chain, branched, saturated and



unsaturated hydrocarbon groups; one of R<sub>1</sub> and R<sub>2</sub> is an alkyl group selected from the group consisting of: C<sub>1</sub> to C<sub>6</sub> alkyl, and the remaining group R<sub>1</sub> or R<sub>2</sub> which is not C<sub>1</sub> to C<sub>6</sub> alkyl is hydrogen; one of R<sub>3</sub> and R<sub>4</sub> is an alkyl group selected from the group consisting of: C<sub>1</sub> to C<sub>6</sub> alkyl, and the remaining group R<sub>3</sub> or R<sub>4</sub> which is not C<sub>1</sub> to C<sub>6</sub> alkyl is hydrogen.

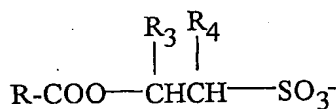
16. An ester anion mixture having surfactant properties useful in formulating cleansing products which comprises:

a) a first ester anion having the structure:



and

b) a different second ester anion having the structure:



in which R is any hydrocarbon group having between about 4 and about 25 carbon atoms, including straight-chain, branched, saturated and unsaturated hydrocarbon groups; R<sub>1</sub> is independently selected from the group consisting of: methyl and ethyl; R<sub>2</sub> is hydrogen; R<sub>3</sub> is hydrogen; and R<sub>4</sub> is independently selected from the group consisting of: methyl and ethyl.

17. A composition of matter useful as a concentrate from which cleansing products may be prepared comprising:

a) one or more ester anions of an alkylisethionic acid according to the formula:



wherein R is a hydrocarbon group having between about 4 and 25 carbon atoms, including straight-chain, branched, saturated, and unsaturated hydrocarbon groups; R<sub>1</sub> and R<sub>2</sub> may each independently be hydrogen or an alkyl group selected from the group consisting of: C<sub>1</sub> to C<sub>6</sub> alkyl subject to the proviso that both R<sub>1</sub> and R<sub>2</sub> are not simultaneously hydrogen; and

b) at least one member selected from the group consisting of: water, a surfactant and optional ingredient used in preparing the cleansing product.

15 18. A composition of matter from which personal care cleansing products may be prepared which comprises:

a) any amount between 99.50 % and 0.25 % of a first component which comprises one or more ester anions of an alkylisethionic acid according to the formula :



in which R is any hydrocarbon group having between about 4 and about 25 carbon atoms, including straight-chain, branched, saturated, and unsaturated hydrocarbon

groups; R<sub>1</sub> and R<sub>2</sub> may each independently be hydrogen or an alkyl group selected from the group consisting of: C<sub>1</sub> to C<sub>6</sub> alkyl, subject to the proviso that both R<sub>1</sub> and R<sub>2</sub> are not simultaneously hydrogen; and

b) any amount between 99.75% and 0.50% of a second component comprising one or more members selected from the group consisting of: fatty acids, alkyl sulfates, an ethanolamine, an amine oxide, alkali carbonates, water, ethanol, isopropanol, pine oil, sodium chloride, sodium silicate, polymers, alcohol alkoxyates, zeolites, perborate salts, alkali sulfates, enzymes, hydrotropes, dyes, fragrances, preservatives, brighteners, builders, polyacrylates, essential oils, alkali hydroxides, water-soluble branched alkylbenzene sulfonates, ether sulfates, alkylphenol alkoxyates, fatty acid amides, alpha olefin sulfonates, paraffin sulfonates, betaines, chelating agents, tallowamine ethoxylates, polyetheramine ethoxylates, ethylene oxide/propylene oxide block copolymers, alcohol ethylene oxide/propylene oxide low foam surfactants, methyl ester sulfonates, alkyl polysaccharides, N-methyl glucamides, alkylated sulfonated diphenyl oxide, and polyethylene glycol.

19. A personal care cleanser comprising an acylalkylisethionate ester having the formula

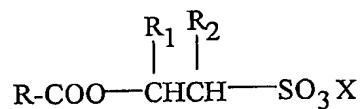


wherein R is a hydrocarbon group having between 4 and 25 carbon atoms; R<sub>1</sub> and R<sub>2</sub> are each independently selected from the group consisting of hydrogen and a branched or straight-chain aliphatic C<sub>1</sub> to C<sub>6</sub> alkyl group subject to the proviso that one of R<sub>1</sub> and R<sub>2</sub> is the branched or straight-chain aliphatic C<sub>1</sub> to C<sub>6</sub> alkyl group while the remaining R<sub>1</sub> or R<sub>2</sub> is hydrogen; and X is selected from the group consisting of hydrogen, an alkali metal, an alkaline earth metal, zinc, aluminum, ammonium and ammonium ions substituted with one or more organic groups.

20. The personal care cleanser of claim 19 further comprising at least one member selected from the group consisting of: amphoteric surfactant; zwitterionic surfactant; anionic surfactant; nonionic surfactant; cationic surfactant; water and optional ingredient.

21. A composition of matter comprising:

(i) an acylalkylisethionate ester having the formula:



wherein R is a hydrocarbon group having between 4 and 25 carbon atoms; R<sub>1</sub> and R<sub>2</sub> are each independently selected from the group consisting of hydrogen and a branched or straight-chain aliphatic C<sub>1</sub> to C<sub>6</sub> alkyl group subject to the proviso that one of R<sub>1</sub> and R<sub>2</sub> is the branched or straight-chain aliphatic C<sub>1</sub> to C<sub>6</sub> alkyl group while the remaining R<sub>1</sub> or

R<sub>2</sub> is hydrogen; and X is selected from the group consisting of hydrogen, an alkali metal, an alkaline earth metal, zinc, aluminum, ammonium and ammonium ions substituted with one or more organic groups; and

(ii) at least one other member selected from the group consisting of: amphoteric surfactant; zwitterionic surfactant; anionic surfactant; nonionic surfactant; cationic surfactant; water and optional ingredient.

22. The composition of matter of claim 21 wherein the acylalkylisethionate ester is present in an amount ranging between about 1% by weight to about 60% by weight.

23. The composition of matter of claim 21 wherein the composition of matter is a shampoo, baby shampoo, baby wipe, children wipe, make-up remover tissue, showergel, foam bath, liquid soap, soap bar, syndet bar, or acne wash.